



MINISTRY OF WAR TRANSPORT

RAILWAY ACCIDENTS

Report by

COLONEL A. C. TRENCH

on the collision which
occurred on 10th November, 1945

at WOKING

on the Southern Railway

LONDON: HIS MAJESTY'S STATIONERY OFFICE

1946

FOURPENCE NET

SOUTHERN RAILWAY

MINISTRY OF WAR TRANSPORT,
Berkeley Square House,
W.I.

8th February, 1946.

SIR,

I have the honour to report, for the information of the Minister of War Transport, in accordance with the Order of the 14th November, 1945, the result of my Inquiry into the circumstances of the accident which occurred at 5.32 p.m. on Saturday 10th November, at Woking, on the Western Section main line of the Southern Railway.

The 4.54 p.m. steam passenger train, Waterloo to Basingstoke, was just moving forward, after having been detained at Woking Down Through Home signal, when it was struck in rear by the 5 p.m. steam passenger train, Waterloo to Exeter. The guard of the leading train suffered serious injuries and 22 passengers in this train were also injured, 15 being removed to hospital but in most cases discharged after a very short period; the engine crews of both trains also suffered minor injuries.

The leading train consisted of 8 bogie coaches, and was drawn by engine No. 119, type 4-4-0 with 8-wheel tender, weighing 97 tons in working order. The total weight of engine and train was 354 tons and its overall length was 544 feet. The overtaking train consisted of 10 bogie coaches and was drawn by engine No. 452, type 4-6-0 (King Arthur class) with 8-wheel tender, weighing 130 tons in working order, and having left hand drive. The overall length of this train was 672 feet and its total weight 449 tons, the percentage of brake power being 63 per cent. All coaches of both trains consisted of timber bodies on steel underframes and all had Buckeye couplings and Pullman vestibules and were fitted with the vacuum brake on all wheels; engines and tenders of both trains were vacuum braked.

As a result of the collision, which must have taken place at a relative speed of about 20 m.p.h., the trailing end of the trailing coach of the leading train, a brake third, was telescoped for about half its length, the solebars being thrust apart by the overtaking engine and the roof being forced up above the engine chimney; both bogies of this coach were derailed. In addition to this the coach next ahead suffered some distortion of the solebars and the trailing headstock, and other minor damage occurred on this coach and the two coaches next ahead; two buffers of the engine of the leading train were broken.

The engine of the overtaking train came to rest about 140 yards ahead of the point of impact, having driven ahead of it the other train which was already moving forward slowly; the engine of the leading train broke away from its train and came to rest about 400 yards ahead of its leading coach.

The accident occurred opposite the Southern Railway Orphanage, now an emergency hospital; medical assistance and ambulances were available without delay.

The weather at the time was clear and dark; the rail was probably wet.

DESCRIPTION

The 4 track Western Section main line of the Southern Railway at this point runs in a direction roughly East and West. From West Weybridge through Byfleet as far as Woking the line is straight, and on bank until shortly after passing Byfleet station when it runs into cutting which extends to about 1,400 yards from Byfleet Signal Box; about the middle of this cutting there is a road overbridge, and at the end of the cutting the line continues again on low bank to Woking. Gradient is rising at about 1 in 380. The general arrangement and location of tracks, relevant signals etc. are indicated on the attached diagram. Byfleet signals are semaphore and Woking signals are 4-aspect colour light with junction indicators to signal movement over crossovers.

Between Byfleet and Woking there are, worked from Byfleet box, a pair of Intermediate Section signals, known as the Maybury signals, together with a pair of Distant for these. These Maybury Intermediate Section signals are the last semaphores approaching the Woking colour light area, and, in accordance with the Company's standard practice, they are provided with semaphore arms above and colour light "approach" signals below; if the semaphore arm is "on" and its lamp shows a Red (oil) light the colour light signals are not lighted, but if the semaphore is "off" showing a green (oil) light the colour light signal below appears and shows Yellow when the signal next ahead (Woking Down Home) is Red, or shows Green when the signal next ahead is "off". The Distant for these Intermediate Section signals show the usual semaphore (oil) lights of Yellow or Green as the case may be, and one lever for each road operates both distant and stop signals, the semaphore arms being electrically operated. The two lines are track-circuited from the Byfleet advanced starting signals to 440 yards beyond the Maybury signals, the track circuits being repeated in Byfleet box and on the Woking illuminated diagram.

Prior to the war the Maybury signals had, behind the semaphore arm spectacles, oil lamps of special design affording a substantially higher intensity of illumination than the ordinary long burning semaphore signal lamp. During the war, when it became necessary to dim colour light signals, it was considered desirable also to dim these intensified oil lamps, and this was done by frosting the bulls eye lens, a procedure which reduced the light to approximately that of an ordinary long burning lamp. In 1943 the intensified oil lamps, of which a number were also in use elsewhere at points of

special importance, were found to be corroding, and they had to be replaced by standard long burning lamps until it became possible to obtain a further supply of the intensified lamps made to a more durable standard of construction ; these are now under construction but were not available on the date of the accident. The lamps of the semaphores in the Maybury signals were therefore of the standard long burning type ; the lamps of the Distant had always been of that type.

All 4 lamps of Distant and Stop signals for both tracks are repeated in Byfleet signal box by a single repeater which indicates " Out " if any one of the four is out ; the circuit for this is taken through all 4 lamps in series, and is actuated by a tube across the top of each lamp, expansion of which due to the heat of the flame closes a contact at the side.

The Sykes Lock and Block system is in operation between Byfleet Junction (the box next on the London side), Byfleet, and Woking, and there is rotation locking between the Byfleet Advanced Starting Signals and the Maybury Intermediate Signals, so that the former cannot be pulled a second time until the latter have been pulled and replaced ; further, the Maybury signals cannot be pulled until the Woking signalman has plunged to accept a train, and this plunger is locked by the occupation of the track circuit between the Maybury signals and a distance 440 yards ahead of the Woking Down Home signals. No Block Register is kept in the Byfleet box. In normal traffic conditions it is comparatively seldom necessary to hold a train at the Maybury signals pending acceptance from Woking ; estimates of frequency varied from one or two cases a day up to a maximum of about 6 in a day.

REPORT

Driver Powney of the 4.54 p.m. train said that they had a normal non-stop run on the Through line to Woking ; after passing Byfleet under clear signals he found the Maybury Distant off and the Maybury signal showing 1 Yellow colour light. He could not say whether he saw the Green light of the semaphore arm above, though he saw the position of the arm itself ; he thought that the glare of the colour light immediately below tended to obscure the light of the semaphore lamp above. He came to a stand close up to the Woking Down Through Home signal which was Red, at a time which appears to be about 5.28 p.m.

He had stood there about 2 minutes when the signal changed to one Yellow with the diversion sign and he started forward ; he was quite definite in his recollection that the engine started easily without slipping and without his having to reverse, and he had moved forward rather more than a train length when there was a crash in rear of the train and he was thrown down and lost consciousness.

Fireman Hayward also was knocked down but picked himself up quickly and applied vacuum and handbrakes and closed the regulator, after which he called to the Station staff for assistance and went back to protect his train. He had seen the Yellow colour light signal at Maybury for the Down Through road and said that there was also displayed a Yellow colour light for the Down Local road but he could not recollect having seen the Green semaphore lights above. Guard Dowden confirmed that they had come to a stand at 5.27½ by his watch and had stood at the signal not more than 2 minutes before moving forward. He did not see the Maybury signals. He was satisfied that his tail lamp was showing a good light and this was confirmed by the Byfleet signalman.

Driver Webber of the 5 o'clock train said he had a normal run on the Through road from Waterloo, the only check being a momentary one due to a double Yellow outside Surbiton. His Byfleet signals were all clear and as he approached the Maybury Distant he could see two lights of which the right hand one (Through road) was definitely Green ; he was not sure what was the aspect of the left-hand light (Local road) but was inclined to think it also was off. As he approached the Maybury Intermediates he was quite certain that his Through road signal was showing one Yellow colour light, which changed to Green before he reached it ; he did not see the semaphore arm above the colour light nor its light and he did not recollect the aspect of the Local road signal here.

The Woking Down Through Home signal was Yellow when he first saw it, with the diversion sign for the crossover to the Local road, at which time he estimated he was running at about 60 m.p.h. ; he was surprised to see this diversion sign as he would have expected to run to the Through platform, and he made a brake application, heavier than he would have normally for the Woking stop, because of the speed restriction through the crossover.

The engine was not steaming and smoke was beating down as he approached Woking ; he saw the tail lamp of the train ahead at about 2 or 3 engine lengths away and made a full brake application, reducing speed to about 25 m.p.h. at the moment of impact.

Fireman Goodfellow confirmed Webber's statement that one Yellow colour light was displayed at Maybury signals, changing to Green before they reached it. Guard Smith did not see the Maybury signals at all ; he said that the train was slowing down in the ordinary way for the stop at Woking where the collision occurred.

Driver Bridge of the 3.44 p.m. goods train, Feltham to Bordon, said he was running on the Down Local line at about 15 m.p.h. and had found all his Byfleet signals " Off ". As he approached the Maybury Distant he saw good lights in both signals, that for the Local line being Green and the Through line signal Yellow ; he said he could distinguish the corresponding positions of the semaphore arms.

About this time he was passed by a train on the Down Through line, running at perhaps 30 m.p.h. with steam shut off so that its smoke temporarily obscured his vision.

Thereafter, Bridge saw a single Yellow colour light at the Maybury Intermediate signals with the Green light of a semaphore above it ; there was no colour light displayed for the other road and he could not see any light in the semaphore above it, but he was quite certain that the Yellow colour light with Green semaphore above were the signals for his (Local) road, by reason of the fact that he could see the loom of the Through road post to the right of his signal lights. He could not see the position of the semaphore arms in this case, probably because of the blinding effect of the Yellow colour light below. As he approached the Maybury signals he saw beyond them the Woking Home signals for Through and Local roads both showing Red ; his (Local) road signal remained Red until he came to a stand after the collision.

While still approaching the Maybury signals he had seen flashes ahead and then a shower of sparks ; he thought there might be something wrong and approached the Woking Home signal cautiously, saw someone coming towards him with a lamp and then came to a stand about 200 yards away from the Woking Home signal and about level with the tail end of a train standing on the Through line.

Fireman Leming confirmed his driver's statement as to the single Yellow colour light at the Maybury signals, but he did not know the road very well and could not say more than that. Guard Busby also confirmed Driver Bridge's statement as to the Down Local Distant showing Green and the Down Local Intermediate showing a Yellow colour light with the Green light of the semaphore above it ; he could not speak as to the Through line Distant but was sure there was no colour light on the Down Through Intermediate.

Goods Porter Signalman Godfrey in Byfleet signal box said that he had had " Out of Section " from Woking for the 4.45 p.m. Portsmouth Electric on the Down Through line some minutes before he received " Entering Section " for the 4.54 p.m. Basingstoke train, so that he was able to offer the latter forward to Woking who accepted it ; he was thus able to pull off his Maybury signals for it as well as all Byfleet signals. After the 4.54 p.m. had passed him he replaced his signals, and after it had occupied and cleared the Maybury track he replaced the Maybury signals. He gave " Out of Section " to Byfleet Junction who thereupon asked for " Line Clear " for the 5 o'clock Exeter train.

Godfrey gave him " Line Clear " and lowered all his Byfleet signals but could not offer the train forward to Woking as he had not had " Out of Section " for the 4.54 p.m. train ; he therefore left his Maybury signals in the " On " position. The train passed his box and the track circuit between his advanced starter and Maybury signals showed " Occupied " ; he was waiting to be able to offer it forward to Woking when he saw the track circuit go to " Clear ", and realising that the train must have passed the Maybury signals, he sent " Train running away " to Woking.

Godfrey said that when he came on duty at 3 p.m. that afternoon, his light repeater was showing " Out ". He did not report this to anyone as he had found it showing " Out " on a number of occasions and had reported it to the Lineman who had put it right, but it sometimes only remained right for a few hours. He therefore made it his practice when his repeater was showing " Out " to go down to the platform outside his box and look for the signal lights themselves, and if he could see all 4 alight he disregarded the indication " Out " of the repeater. On this occasion he went down about 5 p.m. and was satisfied that he could see all 4 Maybury lights.

Signalman Elston at Woking saw the track circuits on his diagram " Occupied " by the 4.54 p.m. train as it drew to a stand at his Down Through Home signal ; he estimated that it might have been standing there for about $1\frac{1}{2}$ minutes before a train at the Down Local platform moved off and cleared the controlling track circuits. Immediately thereafter he set the crossover and pulled off the signal for the 4.54 p.m. train. He had " Vehicles Running Away " from Byfleet at 5.32 p.m. immediately after which the collision must have occurred as he saw another track circuit ahead occupied at 5.33 p.m. and this occupation was actually by the engine of the 4.54 p.m. train broken away and driven ahead of its train.

As no block register is kept at Byfleet the relative times of trains passing on Local and Through lines can only be deduced from the entries at Byfleet Junction and Woking ; these indicate as follows.

Local Line, 3.44 p.m. goods train : Byfleet Junction received " Out of Section " from Byfleet at 5.30 p.m. Woking received " Entering Section " from Byfleet at 5.28 p.m.

Through Line, 5 p.m. express : Byfleet Junction received " Out of Section " from Byfleet at 5.31 p.m.

These timings appear to confirm that both the express and the goods train were well within range of vision of the Maybury signals at the moment at which the express passed the goods train.

Lampman Roberts of Woking who is responsible for the lights of all 4 Maybury semaphores had trimmed them about midday on the day prior to the accident ; he did this regularly on Fridays and inspected the lamps again on Tuesdays. He had on various occasions found more or less soot on the lamps, forming sometimes a hanging cone above the flame.

After renewing the wicks in the Intermediate signal lamps and refilling them with oil which he had brought from the 200 gallon container at Woking which was not nearly empty, he adjusted the wicks and had to carry them some little distance to the signals by which time he had found by experience that the flame had drawn up to a steady condition ; he then checked the height of the flame and considered it satisfactory. There is a mark on the glass to indicate the correct height of flame in the ordinary long burning lamp. Roberts was satisfied that when he left the lamps they were in order and properly adjusted ; he has had many years experience as lampman, but since the introduction of the colour light signalling at Woking he has no other ordinary signal lamps to deal with except the 4 Maybury signals.

A few minutes after the accident, Roberts was on the Up platform at Woking when he met a porter who told him there had been an accident. Roberts stated that he immediately looked from the Up platform and could see the back lights of both the Intermediate signals.

Chief Lineman Owen was testing various features of the locking in Byfleet box about 9 p.m. and observed that the light repeater of the Maybury signals was showing "Out".

Sub-Inspector Lucas went to the Maybury Intermediate signals about 9.20 p.m. and could not see either front or back light in the Down Through signal from a short distance on either side; the light in the Down Local signal was satisfactory. About midnight he went there again and climbed up the post when he saw a "tiny red glow" in the Down Through lamp. On taking the lamp up he found a stalactite of carbon about $2\frac{1}{2}$ inches long hanging from the bar of the expander right down to the burner, and no appreciable light could be seen though the flame was not actually extinguished. The stalactite of carbon fell to pieces as he touched it. The lamp then went out in a gust of wind; he relit it, found it was smoking, turned it down a trifle and thought that it was then burning satisfactorily.

Lineman Tuffin inspected the lights in the 2 Distant about 2 a.m. next morning and found them rather sooted up and the Down Through Distant only visible at about 100 yards; after this he saw the lights in the 2 Intermediate signals which were showing good lights. About 12 noon on the same day he again inspected the latter and found that the light of the Down Through signal was almost invisible due to a hanging cone of soot similar to that found earlier by Sub-Inspector Lucas. The light in the Down Local was not so bad as the Through but it also was sooty, and in each of them the repeater contact was open, thus showing "Out" in Byfleet box.

The possible bearing of wartime quality oil on this matter is referred to later.

CONCLUSION

I think it may be accepted that the Maybury Intermediate Down Through semaphore was in the stop position and that its oil lamp was so much obscured by soot as to be invisible; further, that there was only one Yellow colour light displayed at that location, i.e. the light applicable to the Down Local line.

I conclude that, as a result of this state of affairs, Driver Webber of the 5 o'clock express mistook the Yellow colour light of the Local line as being the signal applicable to his (Through) line: it is more than probable that he was, perhaps unconsciously, influenced by the fact of seeing in the distance the Woking Down Through Home showing Yellow. I find it impossible to credit his statement that this Maybury colour light changed to Green before he passed it. I think it is probable that the Down Through Distant was showing only a dim Yellow light when Webber's train approached it, and his vision may have been hampered by smoke beating down with the result that he took the Green of the Down Local Distant as being his signal.

Webber is 58 years of age with 41 years service with the Company; he has been a driver since 1920, and has a clear record.

Signalman Godfrey at Byfleet admitted that his Maybury Light repeater was showing "Out" and he should not therefore have permitted trains on either Through or Local roads to proceed beyond his Advanced Starter until he had acceptance from Woking. He said he was satisfied by personal observation that all 4 Maybury signal lamps were alight. I accept his statement that he looked to see these lights from the platform outside his box about 5 p.m., but I think it is certain that he could not have seen all four semaphore lamps alight (Distant at 1,873 yards and Intermediates at 2,645 yards) having regard to the other evidence as to the condition of some of the lamps shortly afterwards, and the brightness of the Woking colour light signals beyond.

In the circumstances, he must accept some share of the blame for the accident. He is 40 years of age, with 25 years service with the Company; he has been Porter Signalman since 1931 and has a good record with an entry of an award for alertness some years ago.

Guard Smith failed to carry out the provisions of Rule 148(a) instructing a guard to watch the running of his train and take any action necessary when approaching important junctions, terminals and stations at which his train is booked to stop. Despite his pre-occupation with the preparation of his journals, 4 copies of which had to be prepared, the approach to Woking is clearly one of the occasions described in the above Rule, and he should have looked for the signals, in which case it would have been possible for him to take action in time to rectify his driver's mistake. He cannot be relieved of all responsibility in connection with the collision.

Smith is 58 years old, and has 41 years service with the Company, 22 years as a Passenger Guard. He has a clear record.

It is impossible to determine whether the sooting up of the signal lamps was due to their having been trimmed by Lampman Roberts with the wick too high or to inferior oil, or possibly oil from a dirty container; a sample of oil from the same container was tested afterwards and found up to standard, but on the other hand the repeated sooting up of these lamps after the accident despite cleaning and adjustment, some of which is mentioned above, seems to point to poor quality oil. In the circumstances I think Roberts is entitled to the benefit of the doubt, though I find it difficult to credit his statement that he saw both the back lights clearly from Woking platform shortly after the accident.

RECOMMENDATIONS AND REMARKS

Any abnormality in the *pattern* of the lights displayed to a driver at any particular location is liable to be misleading, and the point is particularly important in the case of the Maybury Intermediate signals, by reason of the fact that the colour light signals which are frequently displayed at one or other of them, are so much brighter than ordinary semaphore lamps as to tend to blot out any such lamp on the adjacent post, the two posts for the two adjacent Down lines being fairly close together. I understand that the Company have now been able to install two intensified light lamps at the Maybury Intermediates; I think that these lamps, with proper attention and satisfactory oil, should meet all requirements, as this type of lamp did before the war, and I have therefore no recommendations to make in this respect. It will, I imagine, be unnecessary to emphasise to the Signalmen at Byfleet that they must in future accept the indications of their light repeater, and if it indicates "Out" hold trains at their Advanced Starters pending acceptance from Woking.

In the event of the continuance of trouble with the lamps of these 4 signals I suggest the Company should provide separate light repeater circuits for Through and Local roads. This would not only make the circuits less delicate but would halve the inconvenience caused by any actual failure.

Light repeaters for oil-lit signals necessarily involve the unsatisfactory feature of actuation, not by the light, but by the heat of the flame which produces the light. This amount of heat is small, particularly with the long burning type of lamp, and the range of expansion of the element between the indication "Light in" and "Light out" is therefore strictly limited. This gives rise to cases of the light indicator showing "Out" when in fact the signal is showing a reasonable light, though the flame is giving insufficient heat to close the expander contacts. As a result, there is a risk of the apparatus being regarded as unreliable by the signalmen, which may result in a defective light remaining undetected.

These inherent difficulties have undoubtedly been aggravated by the absence during the war period of the specially refined oil normally used in these lamps. The substitute oil has given difficulty in providing enough heat to actuate the expander without producing soot which in quite a short time may virtually extinguish the light.

The use of apparatus of any kind which is or may be suspect by the men for whose benefit it is provided, is obviously undesirable, and there appears to be a field for investigation with a view to improvement, in apparatus of this kind, by the use of a heat repeater with a wider range of expansive movement and by the elimination of extraneous temperature variations from the lamp case itself.

In this particular case, according to Signalman Godfrey's evidence, the repeater had on a number of occasions over a considerable period been indicating "Out" when he had reason to think that this indication was incorrect; a number of complaints to the Lineman had resulted in rectification in each case, usually by cleaning the lamp or adjustment of the flame, but had not effected a permanent cure, with the result that the reliability of the repeater apparatus had become suspect in the minds of the signalmen.

I understand that the proper course in such case (when two Departments and the staff of two stations were concerned) would have been for the Signalmen to have reported the recurrent trouble to the Station Master, who would in turn report to the Divisional Superintendent in order that the matter might be the subject of fuller investigation.

Probably the only possible action in this case, pending a reversion to pre-war quality oil, would have been to explain to the Byfleet signalmen the reason for the intermittent irregularity of their light repeater, and to emphasise that they must invariably accept its indications (as is indeed prescribed at present) and if it is showing "Out" must not allow trains to proceed beyond their Advanced Starters pending acceptance from Woking; such an explanation of the circumstances would have put the signalmen properly in the picture, and the resulting position should have been to that extent more satisfactory than the position which actually existed.

I suggest that the Company should make certain that all members of their staff realise that it is their duty as well as their interest to see that any such apparent irregularities, if not put right, are brought to the attention of a responsible officer.

Early in the war it was found necessary to discontinue the manufacture of the specially high quality oil which was known as Long Burning oil and which was used by the Railway Companies for their signal lamps. Generally speaking the war-time oil has had a greater tendency to sooting and it has been necessary to guard against this by more frequent inspection and by allowing a slightly smaller flame than was permitted with Long Burning oil, resulting of course in lesser visibility of the signal lamp.

It is clear from remarks made on a paper read before the Institution of Railway Signal Engineers in 1944, and from other enquiries, that a certain number of cases of similar trouble with war-time oil have occurred on other lines, but neither on the Southern nor on other lines have the difficulties been so serious as to involve grave risks, and the disadvantages have had to be accepted as a war-time handicap.

Nevertheless, any reduction in the visibility of semaphore signal lamps cannot but be a material handicap to drivers, and more noticeably so since the abolition of the general blackout; I think therefore that the Companies as a whole should press their suppliers for the restoration of the pre-war quality long burning oil at the earliest possible date.

It will be appreciated that the trouble in this case arose largely from the signalman's uncertainty as to whether the presumed failure was attributable to the lamp itself, which the lampman should rectify, or to the repeater circuit, which is the business of the lineman. I understand that the Company are issuing an instruction to clarify the action to be taken in such cases.

An unusual feature was that the engine of the leading train travelled forward, after the impact and after parting from its train, for a distance of some 400 yards, the regulator being slightly open. Investigation of the cause of its doing this, despite the parting of the train vacuum pipe, led to the discovery of a fracture in a short length of flexible hose in the pipe line leading from the upper side of the tender and engine vacuum brake cylinders to the ejector, resulting in the admission of air to the upper side of the pistons, destroying the vacuum there and thus losing all brake effect. The final opening in this hose, which was not in good condition, must have been caused by the impact of the collision, as the brake test at Waterloo had been satisfactory and the brake had been used during the journey with normal efficiency.

This accident is one which would probably have been prevented by Automatic Train Control of the Warning type. It is also one which was largely attributable to war conditions.

I have the honour to be,

Sir,

Your obedient Servant,

A. C. TRENCH,

Colonel.

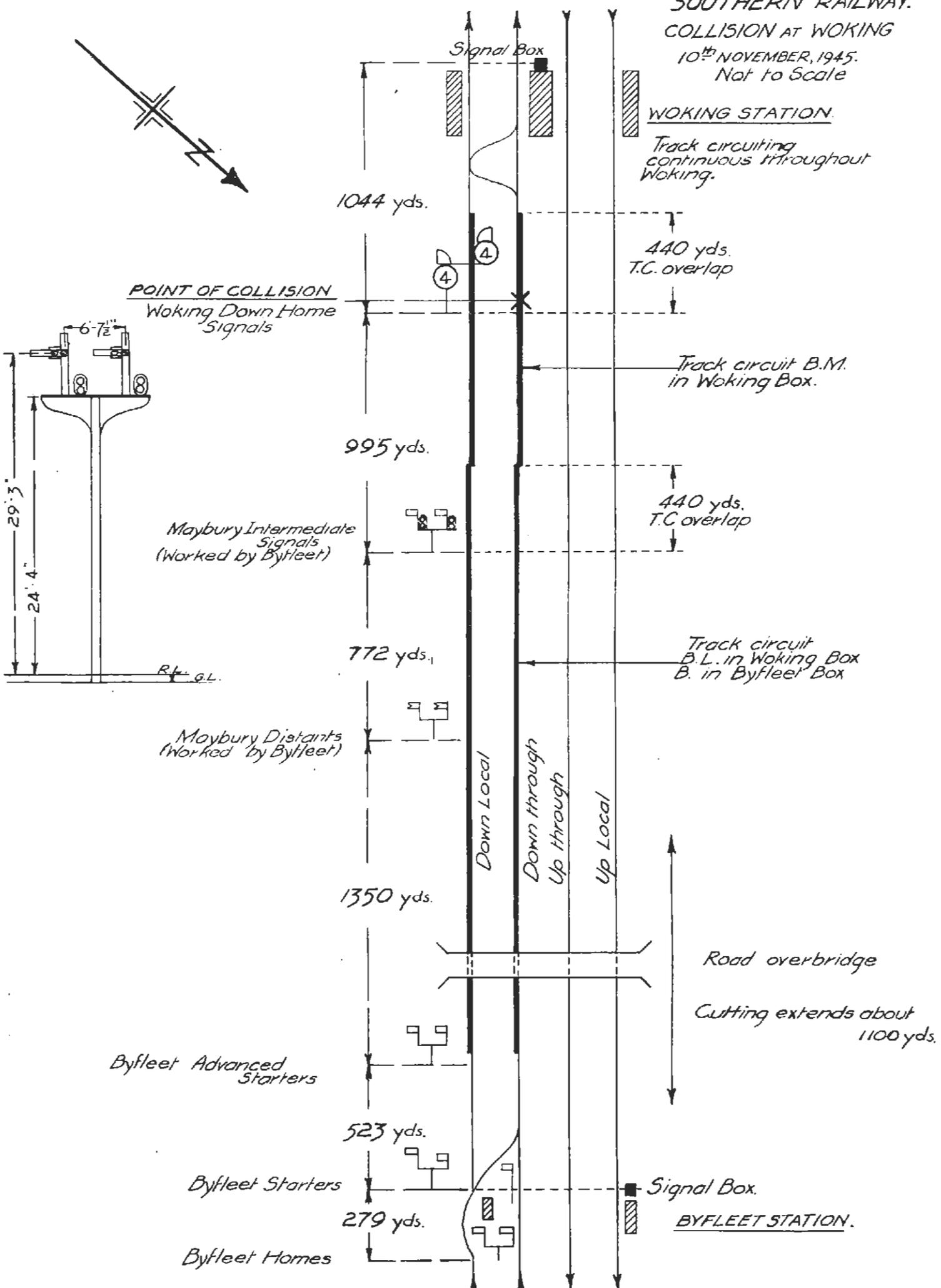
The Secretary,
Ministry of War Transport.

SOUTHERN RAILWAY.

COLLISION AT WOKING

10th NOVEMBER, 1945.

Not to Scale



WOKING STATION.

Track circuiting continuous throughout Woking.

POINT OF COLLISION
Woking Down Home Signals

Track circuit B.M. in Woking Box.

Maybury Intermediate Signals (Worked by Byfleet)

440 yds. T.C. overlap

Track circuit B.L. in Woking Box B. in Byfleet Box

Maybury Distant Signals (Worked by Byfleet)

Road overbridge

Cutting extends about 1100 yds.

Byfleet Advanced Starters

Signal Box.

BYFLEET STATION.

Byfleet Starters

Byfleet Homes

From Waterloo - 21 miles
From Byfleet junction - 1 1/2 miles